OPERATING INSTRUCTIONS MANUAL

(Please retain for future reference)

For

FVN/P-200 INDIRECT FIRED SPACE HEATERS

CERTIFIED FOR USE IN CANADA AND U.S.A.
As per Standard ANSI Z83.7/CSA 2.14 2000 Gas Fired Construction Heaters / Unattended Type.

FLAGRO INDUSTRIES LIMITED
ST. CATHARINES, ONTARIO
CANADA

GENERAL HAZARD WARNING:

FAILURE TO COMPLY WITH THE PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER, CAN RESULT IN DEATH, SERIOUS BODILY INJURY AND PROPERTY LOSS OR DAMAGE FROM HAZARDS OF FIRE, EXPLOSION, BURN, ASPHYXIATION, CARBON MONOXIDE POISONING, AND/OR ELECTRICAL SHOCK.

ONLY PERSONS WHO CAN UNDERSTAND AND FOLLOW THE INSTRUCTIONS SHOULD USE OR SERVICE THIS HEATER.

IF YOU NEED ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTIONS MANUAL, LABELS, ETC. CONTACT THE MANUFACTURER.

WARNING:

FIRE, BURN, INHALATION, AND EXPLOSION HAZARD. KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIALS, PAPER OR CARDBOARD, A SAFE DISTANCE AWAY FROM THE HEATER AS RECOMMENDED BY THE INSTRUCTIONS. NEVER USE THE HEATER IN SPACES WHICH DO OR MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES OR UNKNOWN CHEMICALS.

WARNING:

NOT FOR HOME OR RECREATIONAL VEHICLE USE.

WARNING:

INTENDED USE IS PRIMARILY THE TEMPORARY HEATING OF BUILDINGS UNDER CONSTRUCTION, ALTERATION, REPAIR OR EMERGENCIES ONLY.

ALWAYS PROVIDE ADEQUATE VENTILATION. 1 SQ. IN. OF FRESH AIR MUST BE SUPPLIED FOR EVERY 1000 BTUH OF HEAT.

THIS HEATER SHALL BE INSTALLED SUCH THAT IT IS NOT DIRECTLY EXPOSED TO WATER SPRAY, AND/OR DRIPPING WATER.

This heater is designed and approved for use as a construction heater under Standard ANSI Z83.7/ CGA 2.14. 2000.

We cannot anticipate every use which may be made of our heaters. CHECK WITH YOU LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT APPLICATIONS.

Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these.

SPECIFICATIONS

Model ……	FVP-200 Propane FVN-200 Natural Gas
Input ……....	200,000 btuh
Fuel …….	FVP-200 Propane FVN-200 Natural Gas
Manifold Pressure …….	3.5” W.C. Propane 3.5” W.C. NG
Maximum Inlet Pressure ……	13.0” W.C. Propane 10.0” W.C. NG
Ignition ……	Direct Spark Ignition
……..….	Thermostat Control
Air Circulation …….	1500 cfm
Fuel Consumption …….....	9.25 lbs/hr Propane 190 cfh NG
Approved …….....	cETLus listed
Weight …….....	280 lbs

INSTALLATION:

The installation of this heater for use with natural gas shall conform with local codes or, in the absence of codes, with the National Fuel Gas Code ANSI Z223.1/NFPA 54 and the Natural Gas and Propane Installation Code, CSA B149.1-00. This heater must be installed by a qualified gas technician, following local codes published by the authority having jurisdiction. All installations performed in the state of Massachusetts must be completed by a qualified plumber and gas fitter of the State of Massachusetts.

The installation of this heater for use with propane tank or cylinder shall conform with Local codes or, in the absence of local codes, with the Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58 and the Natural Gas and Propane Installation Code, CSA B149.

This heater must be located at least 10ft (3m) from any propane gas cylinder. This heater shall not be directed toward any propane gas container within 20ft (6m).

CONNECTING THE CYLINDER:

If cylinders are used to supply the heater, no cylinders smaller than 100lb capacity shall be used. These cylinders must supply a vapor withdrawal only.

1. All cylinder connections must be made using a wrench to tighten the POL fitting.

2. Be sure that the cylinder valve is in the closed position when connection or disconnecting the cylinder.

3. A soap and water solution must be applied to all connections in order to leak check the system.

The gas must be turned off at the propane supply cylinder(s) when the heater is not in use. When the heater is to be stored indoors, the connection between the propane supply cylinder(s) and the heater must be disconnected and the cylinders removed from the heater and stored in accordance with Standard for the Storage and Handling or Liquefied Petroleum Gases, ANSI/NFPA 58 and CSA B149.1, Natural Gas and Propane Installation Code.

PIPING: This heater must be installed by a qualified gas technician following local codes published by the authority having jurisdiction. Sizing of supply piping must be determined using the length of pipe run as well as total btuh rating of the appliance(s). Appropriate piping tables must be used to determine size of supply piping dependant on the length of run from source.

PRESSURES:

MAXIMUM INLET PRESSURES: LP: 13.0 IN. WC.
NG: 10.0 IN. WC.

MINIMUM INLET PRESSURES: LP: 8.0 IN. WC.
NG: 7.0 IN. WC.

This heater must be supplied by pressures indicated on the approval label. Over pressure may cause controls to fail.
DO NOT supply this unit with more than ½ psig (14.0 in. W.C.)

Note: A second stage regulator must be installed if the supply pressure exceeds ½ psig.

FUEL:

This heater will operate on propane **OR** natural gas – NOT BOTH. The manifold pressures are listed on the approval label. To determine which fuel to use see rating plate. DO NOT attempt to use the heater without consulting the rating plate.

Note: The proper main burner orifice must be installed and rating plate must reflect the fuel the heater burning. DO NOT operate the heater with out consulting the rating plate.

Heater conversion must be done by a qualified technician and rating plate must reflect any change.

HOSES:

All hoses used to connect this heater of fuel supply must be Type 1 approved propane / natural gas hose assemblies.

ELECTRICAL:

WARNING

Electrical Grounding Instructions

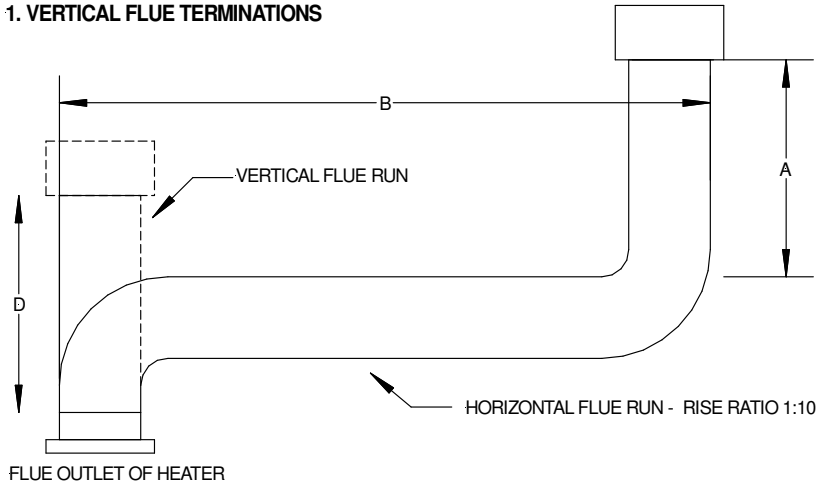
This appliance is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle.

115v supply must be available. Please note that the heater requires 15 amps for proper operation. Ensure appropriate gauge extension cord is used.

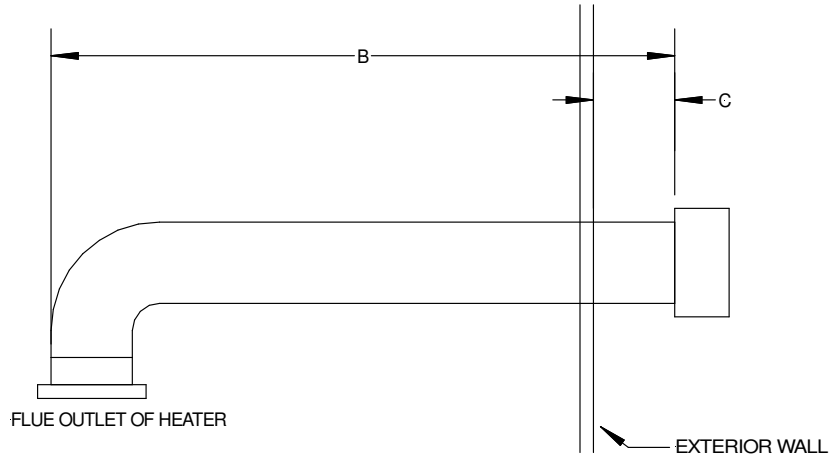
- 12/3 AWG at 50 Feet
- 10/3 AWG at 100 Feet

FV SERIES CONSTRUCTION HEATER – VENTING REQUIREMENTS

1. VERTICAL FLUE TERMINATIONS



2. HORIZONTAL FLUE TERMINATIONS



A - VENT TERMINATION MUST BE A MINIMUM OF 2FT HIGHER THAN ANY POINT WITHIN 10FT.

B - MAXIMUM HORIZONTAL RUN IS 30FT.
NOTE: 90deg ELBOW = 10ft HORIZONTAL VENT ALLOWANCE
45deg ELBOW = 5ft HORIZONTAL VENT ALLOWANCE

C - VENT TERMINATION IN HORIZONTAL POSITION MUST BE MINIMUM 4ft FROM ANY COMBUSTABLE SURFACE

D - EXTERIOR VERTICAL VENT TERMINATION MUST BE A MINIMUM OF 2ft.

NOTE: ALL VENT TERMINATIONS MUST HAVE A RAIN CAP INSTALLED AS PER LOCAL CODE REQUIREMENTS.

CLEARANCE TO COMBUSTIBLES:

Model FVN/P-200

TOP	FRONT	SIDES	REAR	FLUE PIPE
3 ft	10 ft	1 ft	2 ft	3 ft

MAINTENANCE:

1. **Every construction heater should be inspected before each use, and at least annually by a qualified service person. Incorrect maintenance my result in improper operation of the heater and serious injury could occur.**

2. The hose assemblies shall be visually inspected prior to each use of the heater. If it is evident there is excessive abrasion or wear, or the hose is cut, it must be replaced prior to the heater being put into operation. The replacement hose assembly shall be that specified by the manufacturer.
3. The appliance must be kept clear and free from combustible materials, gasoline and other flammable vapors and liquids.

4. The flow of combustion and ventilation air must not be obstructed. Be sure to check the fan assembly and ensure that the motor and blade are operating properly.

5. Compressed air should be used to keep components free of dust and dirt build up. Note: Do not use the compressed air inside any piping or regulator components.

6. Fan Limit Switch (Part# FV-407A) should be replaced if the fan motor does not shut off after the heat exchanger has cooled down.

7. High Limit Switches (Part# FV-206 & FV-437) should be checked each season. These limit switches will ensure the burner shuts down if the temperature exceeds 250°F at the outlet.

8. Heat Exchanger should be cleaned if smokey conditions continue even after the air adjustments on the burner are made.

START UP INSTRUCTIONS:

1. Be sure the switch is in the “OFF” position.
2. Ensure electrical cord is grounded and heater is on a level surface.
3. Plug in supply cord to 115v, 15amp outlet.
4. Make sure Smart Indicator Light is green, if not green, please refer to the “Power Supply Indicator Label” before proceeding with start up.
5. Move switch to “MANUAL” position for manual control.
6. Move switch to “THERMOSTAT” position for thermostatic control.

Please Note:

1. If using Thermostat on unit, unit must be started in Thermostat position.
2. When changing between manual and thermostat operation, the heater must be left in the “OFF” position for 30 seconds to prevent the burner from locking out.
3. When using a generator for electrical supply, make sure the generator is properly grounded and generator is at a 60Hz frequency.
4. In the event that a generator is being used and the generator runs out of fuel, make sure the heater switch is in the “OFF” position before restarting generator, failure to do so may damage heater.

TO SHUT DOWN:

1. Close main gas supply valve while heater is operating.
2. Move switch to “OFF” position.
3. Disconnect heater from gas supply.

NOTE: Fan will continue to operate after the burner shuts down. Once the unit cools down, the fan will stop.

IF HEATER FAILS TO START:

1. Press manual reset button at rear of burner.
2. Check gas pressure supply. Supply and manifold pressure must follow those on rating plate.
3. Ensure proper power supply and extension cord is being used.
4. If heater fails to ignite after 3 attempts, call your supplier for service.

SAFE OPERATION PRECAUTIONS:

1. For use with propane or natural gas only. See approval label.
2. Use switch to shut down the heater. Do not try to shut down the heater by unplugging the electrical cord.
3. Do not plug anything other that the thermostat into the “Thermostat” plug.
4. Follow electrical requirements shown on rating plate and/or Electrical requirements section of this manual.
5. Before removing any guards or performing any maintenance, be sure that the main power supply is disconnected.

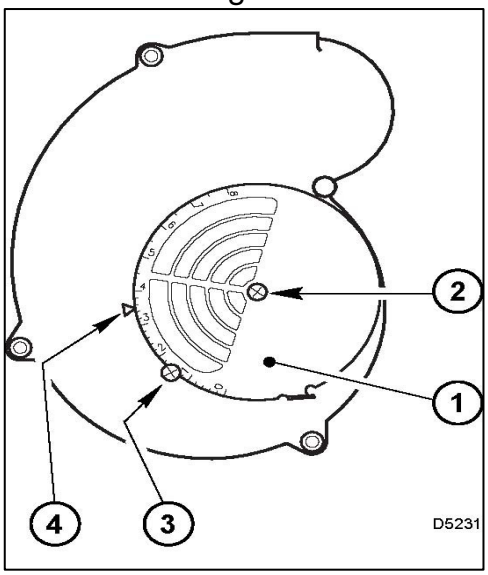
COMBUSTION AIR ADJUSTMENTS:

NOTE: Proper combustion air adjustment must be achieved using a certified combustion analyzer to ensure complete combustion.

The air adjustment should be made to achieve 10% CO_2 on natural gas and 12% CO_2 on propane.

SETTING THE AIR ADJUSTMENT PLATE

A) Regulation of the combustion air flow is made by adjustment of the manual AIR ADJUSTMENT PLATE (1) after loosening the FIXING SCREWS (2 and 3). The initial setting of the air adjustment plate should be made according to Column 5 in the Burner Set-up Chart.



B) The proper number on the manual AIR ADJUSTMENT PLATE (1) should line up with the SETTING INDICATOR (4) on the fan housing cover. Once set, the air adjustment plate should be secured in place by tightening SCREWS 2 and 3.

C) The final position of the air adjustment plate will vary on each installation. Use instruments to establish the proper settings for maximum CO_2.

NOTE: Variations in flue gas, CO_2 and temperature readings may be experienced when the burner cover is put in place. Therefore, the burner cover **must** be in place when making the final combustion instrument readings, to ensure proper test results.

BURNER SET-UP CHART

1	2	3	4	5
FIRING RATE (BTUH)	**ORIFICE-LP**	**ORIFICE-NG**	**HEAD SETTING**	**AIR DAMPER SETTING**
200,000	PART # FVP-225	PART # FVN-226	5	3 LP 3.8 NG

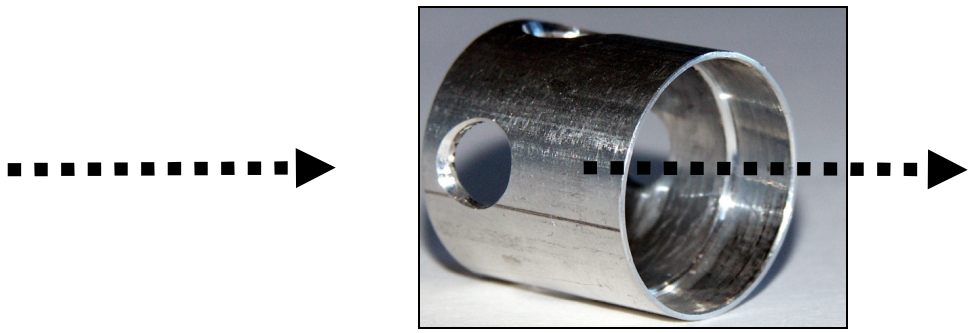
TEMPERATURE FEELER GAUGE ADJUSTMENT
(ATTACHED TO FAN SWITCH)

The temperature feeler gauge is required to be always touching the heater exchanger.

The temperature feeler gauge controls the air flow over the fan switch, which eliminates any unnecessary fan cycling. The temperature feeler gauge can be adjusted for different outside temperatures, by rotating the location of the temperature feeler gauge holes. This will provide maximum performance of the unit in different applications.

If supply air is warm (-5° C, indoor application):

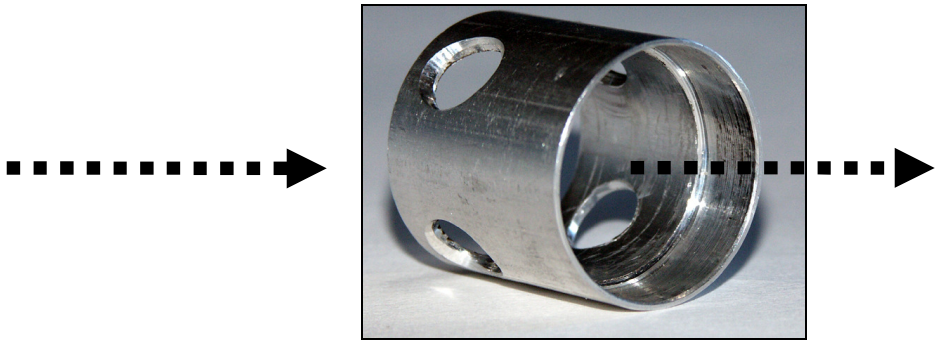
Turn the temperature feeler gauge so that the holes are parallel with the heat exchanger. This will help the fan switch to remain cool and not overheat. See following:



If supply air is cold (under -5° C):

Turn the temperature feeler gauge so that the holes are closed off as the air goes over the heat exchanger. This will reduce fan cycling and the unit from shutting down.

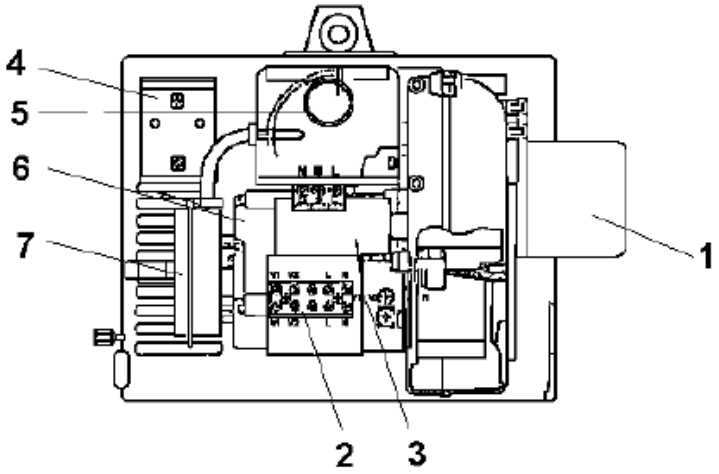
See following:



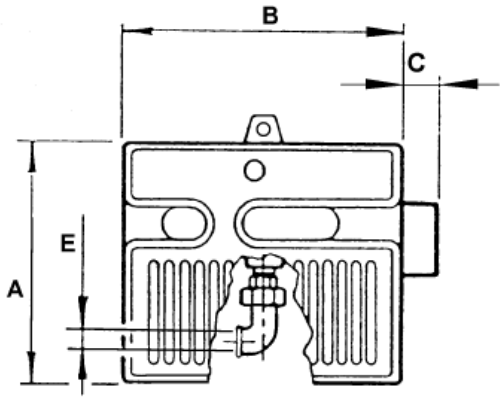
In extreme cold conditions, cover the holes on the temperature feeler gauge using foil tape. Ensure that the temperature feeler gauge is readjusted for warmer weather conditions. Failure to do so may result in burning out fan switches – not covered under warranty.

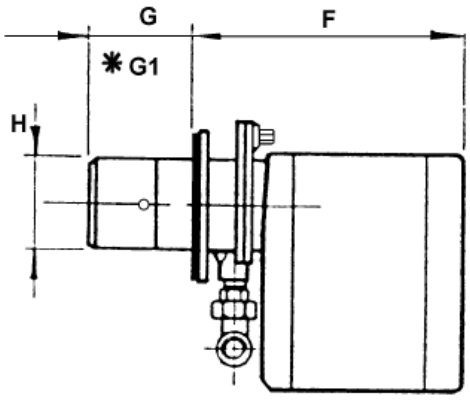
PRINCIPAL BURNER COMPONENTS

1. Electric air shutter assy. (Optional)
2. Field wiring terminal Block
3. Capacitor
4. Gas valve Transformer 120V/24 V (Optional)
5. Integrated primary/ Ignition control
6. PSC burner motor
7. Combustion air proving switch



BURNER DIMENSIONS

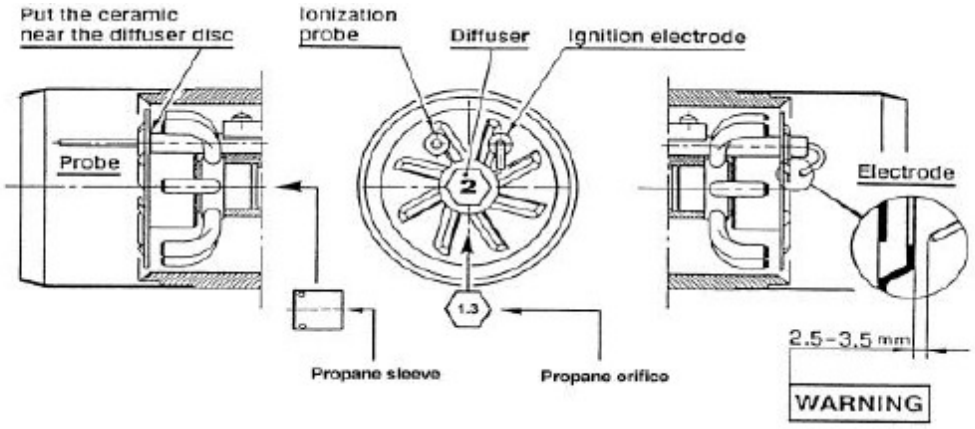




Model 200	A	B	C	F	G	*G1	H
Inches	9 3/16	10 11/16	6 11/16	11 5/8	3 15/16	10	3 9/16
mm	233	272	35	295	85	255	91

*G1 is for LBT version
Gasket thickness is 4 millimeters

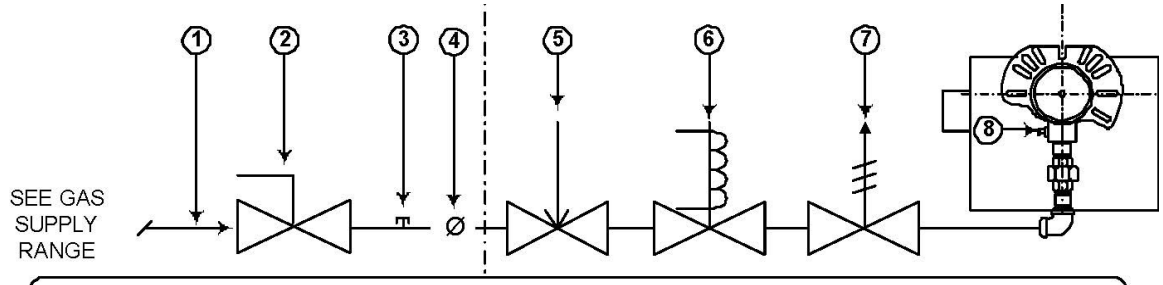
ELECTRODE AND FLAME PROBE ADJUSTMENTS



IMPORTANT: Do not turn the ignition electrode. Leave it as shown in the drawing. If the ignition electrode is put near the ionization probe, the amplifier of the control box may be damaged.

TYPICAL GAS TRAIN LAYOUT

FIELD SUPPLIED RIELLO SUPPLIED



NOTE: ITEMS 5,6 & 7 COMBINATION GAS VALVE(S) ASSEMBLIES MAY BE UTILIZED WHERE APPROVED.

GAS TRAIN LEGEND

❶ GAS SUPPLY & FLOW DIRECTION OF GAS

❷ AS SUPPLY MAIN SHUTOFF MANUAL VALVE (FIELD SUPPLIED

❸ GAS SUPPLY PRESSURE TEST POINT (FIELD SUPPLIED)

❹ GAS TRAIN PIPE DIAMETER SIZE(S): BURNER G200 1/2" NPT

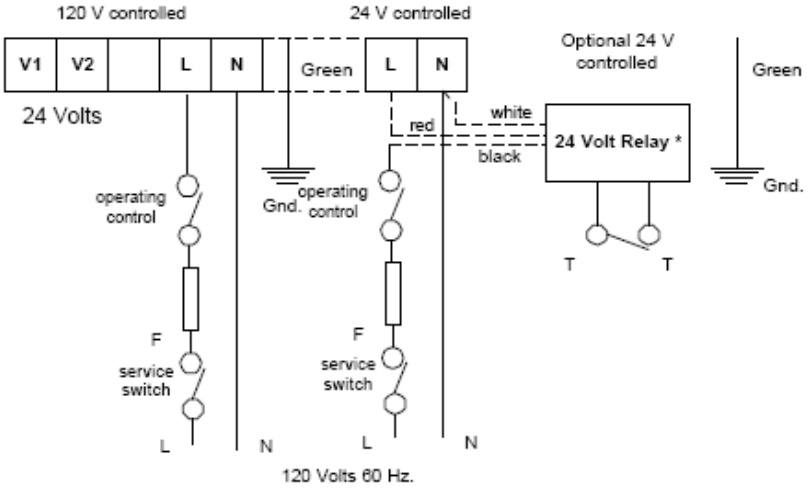
❺ GAS APPLIANCE PRESSURE REGULATOR

❻ SAFETY SHUTOFF GAS VALVE (VS) 24V OR 120V SUPPLIED) OPERATED

❼ MAIN GAS VALVE (V1) 24V OR 120V OPERATED SINGLE STAGE

❽ GAS BURNER MANIFOLD TEST POINT

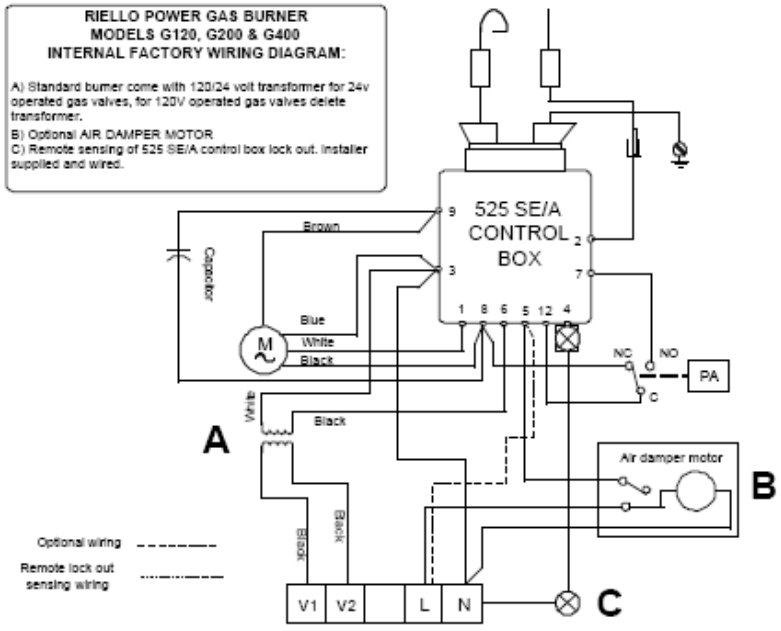
FIELD WIRING DIAGRAM



LEGEND

L = Line 1 (phase)	Gnd. = Ground
N = Line 2 (Neutral)	V1, V2 = Gas valve terminal
F = Fuse	TT = Thermostat
* 24 V switching relay as approved optional	

FACTORY WIRING DIAGRAM



POWER SUPPLY INDICATOR LIGHT - FVO-400 & FVNP-400 & FVO-200 & FVNP-200

Control Box

* **The power supply indicator light will help you detect any faulty power supplied to the heater.**
* **The power supply indicator light will detect various power supply issues such as; gounding issues or reverse Polarity or missing connections**

Warning Light Indications

The smart indicator can detect and display the following fault conditions:

Green Light	→	Meets Power Requirements
Solid Red Light	→	Reverse Polarity
Flashing Red Light	→	Ground or Neutral issue

**** ATTENTION****
IF RED LIGHT IS INDICATED, MAKE CORRECTIONS TO POWER SUPPLY BEFORE TURNING HEATER ON. FAILURE TO DO SO.
WILL VOID ANY WARRANTY

flagro INDUSTRIES LIMITED

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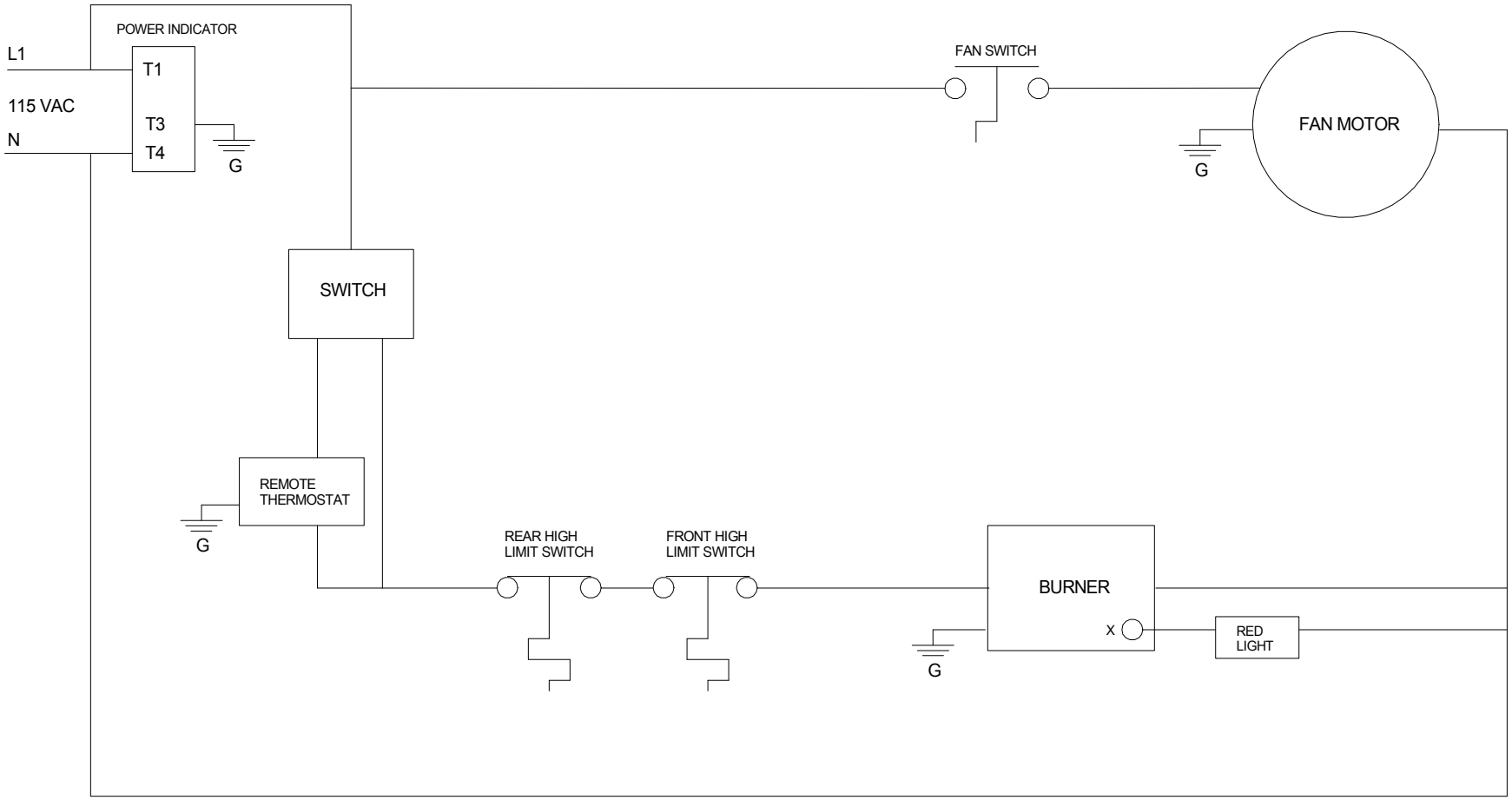
FV-200 SERIES - WIRING SCHEMATIC 2011



FLAGRO INDUSTRIES LIMITED	
TITLE: FV-200 - WIRING SCHEMATIC	**DWG. NO.** FV-200 WS 2011

PARTS LIST FOR FVN-200 / FVP-200

Part Number	Part Description	
FV-201	1/2 HP Fan Motor	
FV-202	15” Fan Blade	
FV-203	12” Wheel	
FV-204	12” Power Cord c/w Plug End	
FV-205	SS Heat Exchanger	
FV-406	High Limit Switch (Outlet) 250F	
FV-407A	Fan Limit Switch (Adjustable)	
FV-407G	Fan Limit Silicone Gasket	
FV-207	Lockable Caster Wheel	
FV-208	Fan Motor Canopy	
FV-409	Toggle Switch (on control box)	
FV-411	Red Light (on control box)	
FV-214	Thermostat Plug (on control box) prior to 2011	
FV-414B	Thermostat Plug (on control box) as of 2011	
FV-215	Female Connector for FV-TH2 (Prior 2011)	
FV-415B	Male Connector for FV-THB (As of 2011)	
FVNP-224	Riello G200 Burner (LP/NG)	
FV-231	Burner Gasket	
FV-433	Feeler Gauge	
FV-433B	Feeler Gauge-Solid	
FV-234	Front Face Plate (1 x 12”)	
FV-437	High Limit (Rear) 150F	
FV-240	Wheel Axle FV-200 Series	
FV-446	Sight Glass c/w Fiber Gasket	
FV-447	Sight Glass Washer	
FV-449SI	Smart Indicator Light	
FVNP-300162	Ignition Module (LP/NG)	
FVNP-3002307	G200 Burner Sub-Base	
FVNP-3005447	Gas Pressure Test Point Adapter	
FVNP-3006687	Chassis Mounting Collar G200	
FVNP-3006899	Distributor Head & Mixing Plate G200	
FVNP-3007274	Electrode Assembly	

FVNP-3007310	Ionization Lead	
FVNP-3020206	Flame Rod Assembly	
FVNP-3007448	Ground Lead & Connector for G200 Burner	

	ACCESSORIES	
FV-HD12	12” X 12ft HiTex Vinyl Ducting	
FV-THA	Thermostat c/w 25FT Cord – prior to 2011	
FV-THB	Thermostat c/w 25 FT Cord – as of 2011	
FVN-227	LP to NG Conversion Kit	
FVP-228	NG to LP Conversion Kit	
FV-VK	6” x 3FT C-Vent c/w Rain Cap	